ADVANCE ADAPTERS INC.

P.O. Box 247, 4320 Aerotech Center Way
Paso Robles, CA 93447
Telephone: **(800) 350-2223** Fax: **(805) 238-4201**

P/N: Orion

New Item: (06/04)

Page Rev. Date: 12-02-15

ORION TRANSFER CASE
Assembly & Disassembly

The Orion was created to replace stock transfer cases built between the years of 1963 and July of 1980. This case replacement is the same external width, eliminating driveline modifications; however, the drain plug may be approximately .500" lower than a stock case. The supplied 4:1 gear set replaces the existing gear set except for the P.T.O. gear or P.T.O. spacer sleeve. It is required that you reuse your stock fasteners, front and rear housings, retainers, shafts, clutch sleeves, and cover plates from your original transfer case. You are supplied a full rebuild kit to replace all bearings, bearing cups, O-rings, seals, and gaskets. Shims for the rear output shaft retainer are also supplied to set the bearing pre-load. **Do not discard shims, washers, sleeves, and spacers from yokes and shafts.** Throughout the disassembly section, reference will be made to items that may be discarded. Attached you will find 3 different illustrations referring to each component by our common terms.

Although this instruction sheet will initiate the steps to install the Orion, it is advised that you obtain a shop or repair manual that covers your specific application.

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ORION TRANSFER CASE POINTS OF CONCERN (PLEASE READ)

The success of an Orion Transfer case installation is dependant on the condition of the necessary components that are to be reused from your stock case. Some of the most critical components that require your attention to detail are as follows: Note: We stock both the output shafts and Hi/Low clutch sleeve, these parts are new not used.

G26- HI/LOW CLUTCH SLEEVE - Inspect for excessive or worn splines. The splines should not be tapered throughout the sleeve width. *You will notice the "V" looking tapers or "boat tails" only at the last .070" to the contact sides of the sleeve towards each gear.*

S5 & S6- SHIFT FORK LOCK BALL AND COMPRESSION SPRING - We have provided a new ball, spring, and brass set screw to be used for your installation. The ball provided measures 10mm and will tighten up the tolerance in the shift fork bore. We have also provided a new spring which has a greater holding capacity than an older worn out spring. The new brass set screw will take the guess work out of setting the tension on the spring and ball inside the new shift fork. The brass set screw should be installed with a bit of Loctite to retain it, and the hex should be seated completely to the shift fork. Note: the new shift rail is retained by a cone point set screw.

G22 & G29- THRUST WASHERS - The thrust washers are an important and critical area when installing the Orion gears on your Toyota shaft. The first step is to inspect the transfer case output shaft for excessive wear and to make sure the gears fits the shaft. If your shaft is worn excessively, the gear will be a loose fit or will be able to wobble. If this is the case with your shaft, replace it. We do offer replacement shafts.

If the shaft is in good shape, then proceed. The end play of the gear on the shaft must be set. The new Orion gears are the same width as a stock gear set. On the early Orions the stock thrust washers were retained and the end play on the gears is what the stock unit had. Unfortunately, in some applications the end play ended up to be close to .030". The factory could have been off or if at some time the output shaft was changed, it could have had different than stock measurements. The shaft and gears should be set at .008"-.012" of end play. We now include two new thrust washers to help set up the transfer case with the correct end play. These thrust washer are stepped. One side has a recess of .015" - .017" and the other side of the washer has a .008" - .010" recess.

Note 1: Occasionally, machining of output shaft shoulder may be necessary to achieve the required gear clearance.

Note 2: Test the gear clearance with the output outside of the case on the bench. By using this method you can eliminate having to remove the assembly from the case to make adjustments. Make sure to press on the bearings fully, install the spacer, speedo gear and park brake drum. Tighten the rear nut to verify that the bearing is fully seated.

If you should have any further questions please call us @ 1-800-350-2223.

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ORION TRANSFER CASE
Assembly & Disassembly

Orion Instructions:

The following instructions cover the disassembly of your stock transfer case along with the assembly of the Orion transfer case. Listed throughout these instructions, we refer to various item numbers. These item numbers represent components on one of the three schematics shown at the end of these instructions. The item numbers listed represent the following: "C" is the case schematic, "G" is the gear schematic, and "S" is the shifter schematic. These drawings also have an index page that corresponds the common terminology of these components.

Drain gear lubricants from transmission and transfer case.

Remove the parking brake drum retaining nut.
On 1963 to 1973 10-spline T/C, or as we'll term **3 Speeds** - Reference item #'s C9, C10, C11. Retain item C9
On 1974 to 1980 16-spline T/C, or as we'll term **4 Speeds** - Reference item #'s C6, C7, C8. Retain items C6, C7
This should be done while still in the vehicle after the front and rear drive shafts are removed. You will be able to slide the brake drum off and then the brake plate assembly. This will keep you from having to remove the brake cable from the brake plate. Once this is achieved, simply unscrew the speedometer cable from the speedometer shaft sleeve.

Stock Transmissions:

We strongly recommend that stock 3 and 4 speed transmission combinations be removed completely from the vehicle. In order to remove the transfer case from your transmission, please refer to a manual that covers your application.

Advance Adapters (spud shaft style) transfer case adapter systems:

If you are removing a transfer case from a transmission that is using our conversion adapter, it is possible to only remove the transfer case. It will be up to your own discretion to unbolt either the adapter housing from the transmission or the transfer case from the adapter housing. In either instance, our conversion adapters require the transfer case to slide rearwards only a few inches to disengage the transmission output shaft from our adapter spud shaft.

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Disassembly of Transfer Case:

Remove and retain output shaft rear bearing retainer C4.
You **do not** have to remove the speedometer assembly.

Remove and retain the speedometer drive gear and spacer from the output shaft, Item #'s G32 & G33.

Remove and retain the front transfer yoke. A wood block during removal may help keep the flange of the yoke from spinning.

When removing the yoke on 3 speed cases, retain washer C25; and on 4 speed cases, retain both washer and shim C21 and C22.

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Remove and retain the front driveshaft shift assembly from your transfer case:

Vacuum- Diaphragm cylinder and transfer front drive fork

Mechanical- Transfer front drive shift shaft guide assembly *(pictured)*

Remove and retain the transfer extension housing with its internal parts, Items C28, G16, G17, G18, G20.

With a dead blow hammer, drive out the front output shaft G18.

Remove and retain snap ring G16 from extension housing C28. Press out ball bearing G17 and discard.

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Remove and retain case cover C13.

Remove the cotter pin, screw plug, compression spring, and shift fork lock ball from the HI and LOW shift fork, Items S5, S6, S7, S8. Invert the case, if need be, to have the spring and ball fall out. These parts will not be reused since a new shift assembly has been provided.

Remove and retain the HI and LOW shift fork shaft lock plate and bolt S2.

Using a drift punch, lightly drive out the HI and LOW shift fork shaft S1 towards the rear of the transfer case.

Remove and discard the HI and LOW shift fork S4 and shift rail S1.

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Remove and retain the transfer case output shaft G25. This may be accomplished by wedging the low speed output gear, G28, with a suitable tool against the case to keep it from moving forward. Using a dead blow hammer, lightly tap the shaft from the rear to drive it forward. This shaft will come out the front of the case with the tapered roller bearing G21, thrust washer G22, high speed gear G24, and the HI and LOW clutch sleeve G26. You must retain the HI and LOW clutch sleeve G26, and thrust washer G22. *The tapered roller bearing may be discarded.*

Remaining in the case will be the low speed output gear, G28, thrust washer G29, and tapered roller bearing G30. You need only to retain thrust washer G29. *The low speed gear and roller bearing may be discarded.*

Remove and retain the transfer case idler gear shaft lock plate and bolt G15 only. *The idler gear shaft, idler gear, and case may be discarded.*

Remove remaining seals, bearings, roller bearing cups, and gears from the original components to be assembled onto Orion. Clean all components thoroughly.

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Assembly:

With the rebuild kit provided, install the new seals, bearings, and roller bearing cups.

Press seal C18 into the Orion. Press seal C5 into the output shaft rear bearing retainer C4. Press ball bearing G17 into extension housing C28 and retain it with the original snap ring G16. Press seal C26 into extension housing.

Press tapered roller bearing cups G21 and G30 into the Orion case and extension housing C28. **Note:** G21 and G30 may be installed after the output shaft assembly, HI and LOW clutch sleeve, and low speed gear are installed into the case.

Install the bearing spacer G10 between needle bearings G9 into the new idler gear G11. Add assembly lube.

Now, place the idler gear in position in the case.

Place idler gear thrust washers G8 into position. Be sure to align the locating tabs on the thrust washers to the channels located on the inner walls of the case.

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With idler gear and thrust washers in position, apply assembly lube to idler gear shaft G13.

Locate the groove cut into the idler shaft for the lock plate. **Lightly lubricate and install the O-ring on this end only.** Install the opposite end of the idler shaft , into the rear side of the transfer case. Using a dead blow hammer, lightly drive the shaft into the idler gear from the rear of the case. **We advise that extreme care should be taken during this installation to prevent any risk of damage to the O-rings.** We have included two additional O-rings in the event that damage should occur. Drive the shaft beyond flush so that the idler gear shaft protrudes just far enough to expose the O-ring groove on the front of the transfer case. Lightly lubricate and install the O-ring on the idler shaft on the front side of the case. Lightly drive the shaft rearwards to its final position and install the lock plate and bolt G15. Caution: **If this shaft is driven too far forward the rear O-ring will become exposed to an oil grove in the inner case. This would cause the O-ring to bulge into this oil grove. When tapping the idler shaft back into its final position it would then cut the O-ring causing the Orion to leak**.

Apply assembly lube and slide high speed gear G24 onto output shaft G25. Next, slide your stock thrust washer or one of the new stepped thrust washer provided (G22) onto shaft. (*NOTE*: Two new thrust washers have been provided. You will find that each side of the new thrust washers have a recess/step. One side of the washer is .008"-.010" and the other is .015"-.017". These steps will ride against the shoulder of the shaft and provides a tighter tolerance or end play on the gear. The ideal end play on the gear to the thrust washer should be .008" to .012". A feeler gage should be used to obtain the correct end play.) Drive on the front tapered roller bearing G21 using a dead blow hammer and P/N 400250 tubular bearing tool. **Be sure to drive against the inner race only.**

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Apply assembly lube and place low speed output gear G28 and HI and LOW clutch sleeve G26 in position within the case. Install output shaft assembly G25 into the case. Install stock thrust washer G29 and rear tapered roller bearing G30 onto output shaft G25. Lightly drive rear tapered roller bearing using a dead blow hammer and P/N 400250 tubular bearing tool *(make sure bearing is seated)*. **Again, only drive against the inner race of the bearing.**

If you have not done so, install tapered roller bearing cups G21 and G30 into the Orion case, and extension housing C28 in addition to ball bearing G17, snap ring G16, and seal C26.

Lubricate the seal lip and install output front shaft G18 into the extension housing C28. Install front yoke, washer, and nut, Items C20-C22 or C23-C25. Tighten nut. Torque range will be 101-123 ft./lbs.

Install extension housing assembly C28, gasket C29, and the front drive clutch sleeve G26 onto the case. **Gasket C29 must be used. Do not use any other gasket substitute.** Be sure to assemble the front drive clutch sleeve with the tapered side of the sleeve towards the rear of the case. Tighten extension housing bolts to 7-11 ft./lbs. of torque.

Re-assemble transfer front drive shift assembly:

Vacuum- Diaphragm cylinder and transfer front drive fork

Mechanical- Transfer front drive shift shaft guide assembly

Slide spacer G32 and speedometer gear G33 onto the output shaft.

Included in your Orion kit are 8 adjusting shims in varied thicknesses. Place bearing adjusting shim(s) G31 in position on the output shaft rear bearing cup G30. Install output shaft rear bearing retainer C4 and gasket C3. **Gasket C3 must be used. Do not use any other gasket substitute.** Tighten retainer bolts to 7-11 ft./lbs. of torque.

Use nut C10 or C8 and run the nut down tight until it stops on output shaft G25. **Do not use the cotter pin or stake the nut.** The HI and LOW clutch sleeve must be in the neutral position and the front drive disengaged. Check the output shaft bearing pre-load by turning the shaft, if using a torque wrench on nut C10 or C8. The output shaft must have a resistance of 10-20 in./lbs. of torque. If using a fish or pull scale coupled to a brake drum bolt a 10 to 13 pound measurement should be obtained. If necessary, adjust the pre-load by selecting a new shim(s). **Improper bearing pre-load setting may cause bearing and/or transfer case failure.**

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Once you have established bearing pre-load, remove and retain nut C10 or C8.
Place the new transfer case HI and LOW shift fork S4 into the transfer case. Align fork with the HI and LOW clutch sleeve and then drive the new shift fork shaft S1. Just beyond the front side of the fork but before the rail enters the case, install the o-rings to the front and rear of the shifter rail. Finish installing the shift rail into the case. Install shift fork shaft lock plate and bolt S2.

Install shift fork lock ball, compression spring, and new brass set screw Items S5, S6, and S7. The new brass set screw will take the guess work out of setting the tension on the spring and ball inside the new shift fork. The brass set screw should be installed with a bit of Loctite to retain it, and the hex should be seated completely to the shift fork. Bolt case cover C13 using gasket C12 to the Orion case. Be sure to properly align the HI and LOW shift lever S9 with the HI and LOW shift fork S4.

Using gasket C19, install the Orion onto your transmission or AA adapter housing, loading items G1 through G7. **Be sure to use supplied mounting bolts for specified locations as outlined on your kit instruction sheet.** Torque the transmissions rear output shaft nut G7 to 101-108 ft./lbs. (AA nut 75 ft./lbs.).

Install the P.T.O. gasket and cover, Items C15 & C16. Install case cover and gasket, Items C1 & C2; OR gasket C2 and AA rear crossmember mount. Install speedometer cable. Lubricate seal lip of seal C5. Install parking brake plate assembly and brake drum. Install washer and nut, Items C9-C11, or C6-C8. Torque to 101-123 ft./lbs. and stake the nut or install the cotter pin. Next, install drain plug C17 and add 2 quarts of **(API GL-4 or GL-5 SAE90)** for a 500 mile break in procedure. Install fill plug C17. Lastly, install rear yoke and both driveshafts. Do a visual check of the installation.

It is recommended that the Orion oil be changed and the magnetic drain plug cleaned after the first 500 miles. The initial break in will produce some metallic debris from the new cast iron case. This debris will adhere to the drain plug and look like thick grease. After the break in procedure is complete, refill with the Toyota's specified lubricant (API GL-4 or GL-5 SAE90).

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Case Schematic Index:

C1 CASE COVER NO.2
C2 GASKET
C3 GASKET
C4 OUTPUT SHAFT REAR BRG. RETAINER
C5 OIL SEAL
C6 SHIM (4 SPEED)
C7 WASHER (4 SPEED)
C8 NUT (4 SPEED)
C9 WASHER (3 SPEED)
C10 NUT (3 SPEED)
C11 COTTER PIN (3 SPEED)
C12 GASKET
C13 CASE COVER
C14 SEAL
C15 GASKET
C16 POWER TAKE OFF COVER
C17 CASE PLUG
C18 SEAL
C19 GASKET
C20 NUT (4 SPEED)
C21 WASHER (4 SPEED)
C22 SHIM (4 SPEED)
C23 COTTER PIN (3 SPEED)
C24 NUT (3 SPEED)
C25 WASHER (3 SPEED)
C26 SEAL
C27 GASKET
C28 EXTENSION HOUSING
C29 GASKET
C30 ORION CASE

Gear Schematic Index:

G1 INPUT GEAR STOPPER (4 SPEED)
G2 INPUT GEAR
G3 P.T.O. GEAR / SPACER
G4 BEARING
G5 INPUT SHAFT SPACER
G6 WASHER INPUT
G7 INPUT SHAFT LOCK NUT
G8 THRUST WASHER
G9 NEEDLE ROLLER BEARING - IDLER
G10 SPACER
G11 IDLER GEAR
G12 IDLER GEAR SPACER (UP TO APRIL OF 1975)
G13 IDLER SHAFT
G14 O-RING (2)
G15 LOCK PLATE ASSY. (IDLER)
G16 SNAP RING
G17 BALL BEARING
G18 FRONT OUTPUT SHAFT
G19 NEEDLE ROLLER BEARING
G20 FRONT DRIVE CLUTCH SLEEVE
G21 FRONT TAPERED ROLLER BEARING CUP & CONE
G22 THRUST WASHER
G23 HIGH SPEED GEAR BUSHING (INSTALLED IN GEAR)
G24 HIGH SPEED GEAR
G25 REAR OUTPUT SHAFT
G26 HI / LOW CLUTCH SLEEVE
G27 LOW SPEED GEAR BUSHING (INSTALLED IN GEAR)
G28 LOW SPEED GEAR
G29 THRUST WASHER
G30 REAR TAPERED ROLLER BEARING CUP & CONE
G31 ADJUSTING SHIMS
G32 SPACER (SPEEDOMETER)
G33 SPEEDOMETER DRIVE GEAR

Shifter Schematic Index:

S1 HI & LOW SHIFT FORK SHAFT
S2 LOCK PLATE ASSEMBLY - HI & LOW SHIFT FORK SHAFT
S3 O-RING
S4 HI & LOW SHIFT FORK
S5 SHIFT FORK LOCK BALL
S6 COMPRESSION SPRING
S7 SCREW PLUG
S8 COTTER PIN
S9 HI & LOW SHIFT LEVER
S10 FRONT DRIVE SHIFT SHAFT BOOT

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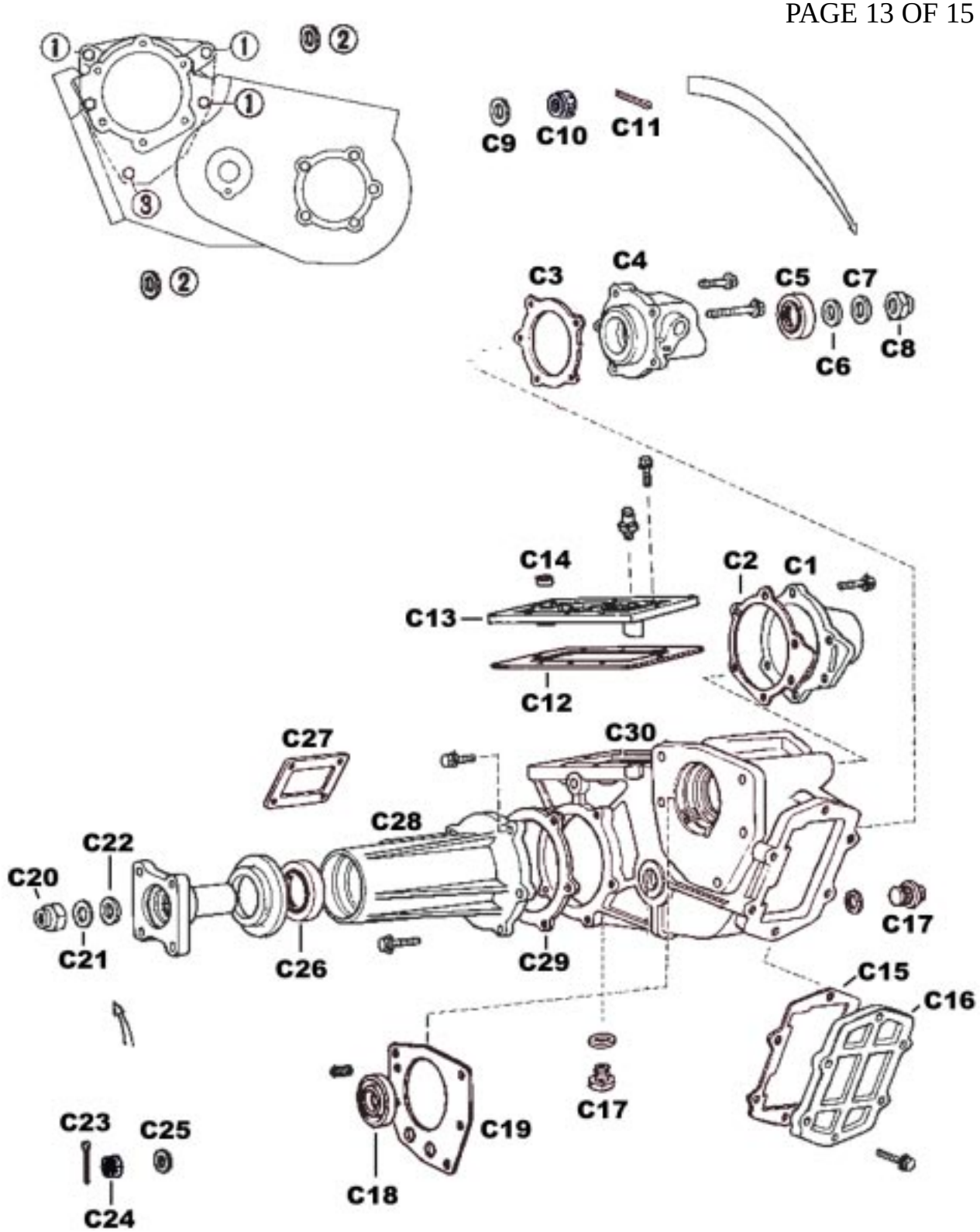
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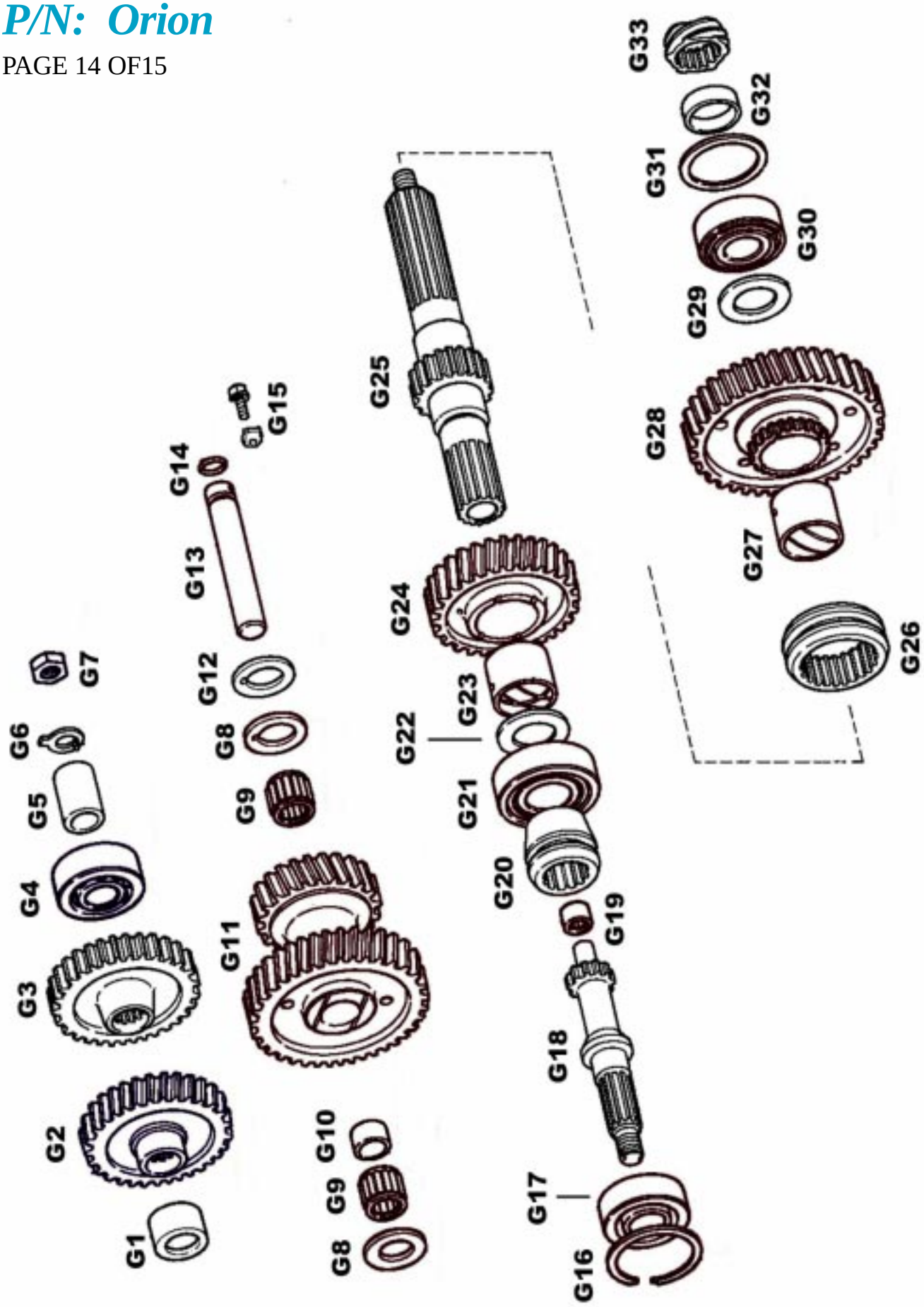
G1
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